

Title of Course: Modular Advanced Practical and Seminar in the Focal Point Programme (Molekulare Regulation und Pharmakologie des Kardiovaskulären Systems: "The pathophysiology of Heart Failure" (185730, 183731) " Inflammation and Oxidative Stress in Heart Failure ")				
Type: Compulsory Course		Workload 120 h	Intended for Semester 1	Duration 1 Semester
1	Module: Elective Practical	Hours per Week 5.25	Self-study 41.25 h	Credit Points 4 CP
2	Teaching Methods: a) A two-week all-day practical lab course in a research group b) A seminar presentation of up-to-date research article			
3	Group Size: 3-4 Students			
4	Learning/Course Objectives: After completion of the course students will have acquired basic practical skills in the preparation and maintenance of Western Blotting, Confocal microscopy and electron microscopy for identification of protein localization as well as interaction of proteins, cell culture, measuring the forces in a single skinned or intact cardiomyocyte from heart failure patients and animal models with heart failure. Students will have increased their knowledge concerning the function of proteins, the effect of some compounds to the cardiomyocyte function, the interaction and co-localization of proteins, as well as evaluation and discussion of the data.			
5	Contents: Topics: The project will exploit human HFpEF biopsies and HFpEF animal models with various comorbidities. These comorbidities will be followed by studying biomarkers of systemic inflammation, endothelial and cardiomyocyte dysfunction, oxidative stress, NO bioavailability and collagen generation/breakdown, which may then be used to stratify HFpEF into different stages and/or phenotypes. This work will be accompanied by further studies of the molecular mechanisms underlying diastolic dysfunction, including mechanical measurements of the direct and indirect effects of oxidative stress and inflammation on titin-based stiffness. HFpEF animal models will subsequently be assigned to different treatment regimens in accordance with the stratification based on biomarker data and our understanding of molecular mechanisms. Questions addressed: <ul style="list-style-type: none"> - What is The effect of oxidative stress on protein phosphorylation and oxidation? - How does oxidative effect the cardiomyocyte function? - How can we prevent these alterations to improve the cardiac function? Methods:			

	Mass spectrometry; Site-directed mutagenesis for in vitro validation; confocal and electron microscopy; Western blot analysis; Force measurements on single skinned cardiomyocytes as well as in intact cells; interaction assays;
6	Degree Courses: Master of Science Biochemistry
7	Prerequisite(s): Knowledge of basic laboratory techniques in molecular biology and Biochemistry
8	Method(s) of Examination: Assessment of active and successful participation in the practical (50 %), a written project report (40 %), and an oral presentation (10 %)
9	Requirements for Acquiring Credit Points: Achievement of at least the mark "sufficient" regarding the above modes of examination
10	Significance for Overall Grade: Weighted according to CPs
11	Frequency: Every winter semester
12	Lecturer(s): Nazha Hamdani and teaching assistants
13	Additional Information: This lab course is one of four courses in total to be completed in the first term, which have to be fulfilled in different Focal Point Programmes